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General Notes.

PETROGRAPHY.[1]

Zirkel's Petrographie.—The second volume of Zirkel's treatise on Petrography[2] has recently appeared in America. It treats with such fulness of the massive rocks that an epitome of its contents is out of the question in this place. The volume discusses the composition, mineral and chemical, the structure and the distribution of the various types of the eruptive rocks with a thoroughness found only in German text-books. The descriptions of their important occurrences will be especially valuable to the student who has not a library at his disposal; and to the investigator, the large and accurate lists of references scattered through the book are very welcome. Many petrographers will differ with the author as to the importance and desirability of some of his types, and others will find fault with him concerning some of his theories, as, for instance, that of the origin of olivine aggregates in basalts. The volume is, however, on the whole quite free from theoretical discussions. While it loses something of its interest in consequence of this lack of theory, the book gains the confidence of the reader, who desires more particularly an account of the work done in the different provinces, where the rocks in which he is interested are to be found.

Inclusions in Volcanic Rocks.—Two articles on the petrographical changes affected by the partial or entire solution of foreign inclusions in volcanic rocks have recently appeared. The first is an essay by Dannenberg,[3] and the second a volume of 710 pages by Lacroix.[4] Dannenberg's article treats more particularly of the inclusions in the Siebengebirge basalts, andesites and trachytes. Zircons, corundum, magnetite, pyrite, feldspar, sillimanite, quartz, sandstone, schists and granite were found included in both basic and acid rocks of the region. Those inclusions that were most similar to the including rocks suffered much less alteration than those that differed most in chemical composition from the lavas. The aluminous compounds frequently yielded spinels as a consequence of the contact action. In many instances different combinations of inclusion and including rocks gave rise to the same new products, so that it is difficult to discover the exact law governing the changes. In the basalts the principal inclusions consisted of single minerals, while in the more acid rocks they comprised largely rock fragments—a fact probably attributable to the different solvent powers of the including material. Lacroix's volume is a nearly complete treatise on the subject of which it treats, which is limited, as the title indicates, to the study of inclusions in volcanic (effusive) rocks only. The author separates inclusions into two classes. The first comprises fragments of an entirely different nature from that of the enclosing rock, as granite in basalt. These he calls enallogenous (enclaves énallogènes). The second class comprehends inclusions more or less similar in composition to the including material. These he terms homogeneous inclusions (enclaves homoeogèues). The second class embraces aggregates formed by segregation and by liquation, as well as true inclusions. The including rocks are also separated into two groups, the basaltic and the trachytic. In the first part of the book the enallogenous inclusions are discussed with great thoroughness. In the second part the homogenous inclusions are studied. In a third part are collected the general conclusions. Chapters are devoted to each class of rocks and divisions of the chapters to the character of the inclusions in them. Resumés and paragraphs embracing the results of the studies are scattered through the volume at convenient intervals, and a geographical index concludes the book. The number of discoveries made by the author in the course of his work is too large for discussion in this place. The book bears evidence of thoroughness throughout. It is an excellent contribution to the subject of contact action.

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[1] Edited by Dr. W. S. Bayley, Colby University, Waterville, Me.

[2] F. Zirkel: Lehrbuch der Petrographie, Leipzig, 1894, pp. iv and 941.

[3] Min. u. Petrog. Mitth. XIV, p. 17.

[4] Les Enclaves des Roches Volcaniques, Macon, 1893, pp. 710, pl. vii, fig. 84.

The Basic Rocks of the Adirondacks and of the Lake Champlain Region.—Kemp[5] gives a brief account of the coarse basic rocks of the Adirondacks of which the well known norite is a phase Associated with the norite are anorthosites, gabbros and olivine gabbros, all of which are more or less schistose. The anorthosites are crushed, and where the shattering has been most intense their plagioclase has been changed to a fine grained aggregate, thought to be saussurite. Augite and brown hornblende are present in these rocks, but not in large quantity. Garnets are always present. The more basic gabbros are dark rocks, whose plagioclase has a greenish tinge due to the abundance of dust inclusions scattered through it. The special features of the gabbros are the reaction rims around pyroxene and magnetite. A zone of small brown hornblendes is often found between the first named mineral and plagioclase. Between magnetite and feldspar are usually three zones, of brown hornblende, pink garnet, and quartz, respectively, the last named mineral occurring nearest the feldspar. Sometimes the order of the zones is different. The quartz may appear within the zone of garnets, in which case the latter mineral may replace the feldspar in part, as alternate lamellae between lamellae of plagioclase. The gabbros contain large bodies of titaniferous magnetite. On the contact of the eruptive with limestone the latter rock has been crystallized and silicified. The same author, associated with Marsters,[6] has described the trap dykes of the Lake Champlain region as camptonites, fourchites, monchiquites and bostonites.

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[5] Bull. Geol. Soc. Amer. 5, p. 213.

The Augite Granite of Kekaquabic Lake, Minnesota.—The granite of Kekaquabic Lake in Northeastern Minnesota, occurs in granitic and in porphyritic phases, according to Grant.[7] In both varieties the constituents are quartz, anorthoclase and other feldspars, augite, a little hornblende, biotite, apatite and sphene. The granitic variety needs no further mention. In the porphyritic phase the quartz and feldspar form a fine grained groundmass in which lie phenocrysts of feldspar and augite. An analysis of this feldspar, whose density is 2.58–2.62 gave:

SiO_2	Al_2O_3	Fe_2O_3	CaO	MgO	K_2O	Na_2O	H_2O	Total
67.99	19.27	.82	.75	.02	3.05	6.23	.90	= 99.03

The augite comprises from 5–20 per cent of the rock. Its tint varies from green to colorless, the lighter colored portion often lying within a darker outer zone. Analysis of the augite yielded:

SiO_2	Al_2O_3	Fe_2O	FeO	CaO	MgO	K_2O	Na_2O	H_2O	Total
53.19	2.38	9.25	5.15	17.81	9.43	.38	2.63	.01	= 100.23

The rock, which is an augite soda-granite, has the following composition:

SiO_2	Al_2O_3	Fe_2O_3	FeO	CaO	MgO	K_2O	Na_2O	H_2O	P_2O_5	Total
66.84	18.22	2.27	.20	3.31	.81	2.80	5.14	.46	tr	= 100.05

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[6] Bull U S. Geol. Survey, No. 107.

[7] Amer. Geol., XI, 1893, p. 383.

Petrographical News.—In a series of articles recently published Vogt[8] discusses the formation of oxides and sulphide ores around basic eruptive rock bodies, describes all the known occurrences of the nickel sulphides with reference to their mode of origin, and reviews critically the literature treating of the differentiation of rock magmas. He shows that the nickel ore deposits that are peripheral must be due to differentiation of rock magmas. He further shows that the laws governing the processes of differentiation are very complicated and that neither Soret's principle nor any other single physical or chemical principle will satisfactorily explain the phenomena.

Dr. G. H. Williams[9] reports the occurrence of volcanic rocks at many localities in the eastern crystalline belt of North America. The rocks in question comprise tuffs, glass breccias, devitrified obsidians and fine grained crystalline flow rocks with many of the characteristics of modern lavas. All these have heretofore been regarded as sedimentary in origin by most of the geologists who have studied them. The author gives his reasons for concluding that they are volcanic, and declares that, not before their true character is recognized will the structure of the crystalline areas of the Appalachians be correctly understood.

Lang[10] discusses the conclusions of Rosenbuch[11] with respect to the chemical nature of the crystalline schists, and criticizes Linck's principles governing the mineralogical composition of eruptive rocks. In his article, which is well worth reading, the author shows conclusively that the mineral compositon of rocks is not determined by their chemical composition.

[8] Zeits f. prakt. Geol., 1893, Jan.,April.

[9] Journ. of Geol., Vol. 2, p. 1.

[10] Min. u. Petrog. Mitth., XIII, p. 196.

[11] Cf. American Naturalist, 1891, p. 327.